SLR-HJ-1

Seat No.	

Set P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: March/April-2024
ELECTRONICS
Advanced Microcontroller (2313101)

Day & Date: Friday, 10-05-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All Questions are Compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. **08**

1) The timer0 overflow from _____.
   a) 00H to FFH b) FFH to 00H
   c) 0FFH to 00H d) 000H to 0FFH

2) PIC microcontroller is _____ bit microcontroller.
   a) 8 b) 16
   c) 32 d) 64

3) The stack pointer is initialized to _____ at reset.
   a) FF b) 0F
   c) F0 d) 00

4) Which of the following instruction is data transfer instruction _____.
   a) TST b) MUL
   c) SJAMP d) LDS

5) In AVR microcontroller Y register is combination of _____.
   a) R26 and R27 b) R28 and R29
   c) R30 and R31 d) None of the these

6) The flash program memory of 16F877 is _____.
   a) 8K b) 128 byte
   c) 256 byte d) 4K

7) The 16F877 support _____ interrupt source.
   a) 15 b) 32
   c) 14 d) 16

8) In AVR, microcontroller Z register is combination of _____.
   a) R26 and R27 b) R28 and R29
   c) R30 and R31 d) None of the these

B) State True/False. **04**

1) The AVR ATmega8 has a maximum of 2 PWM channels.
2) The AVR ATmega8 has a built-in Wi-Fi module.
3) The PIC 16F877 has a built-in ADC (Analog-to-Digital Converter).
4) The AVR ATmega8 uses the Harvard architecture.

Q.2 Answer the following. (**Any Six**) **12**

a) List the features of AVR microcontroller.
b) Explain configuration of IO Ports of PIC Microcontroller as Input and Output.
c) List the Integrated Development Tools for PIC Microcontroller.
d) Draw the architecture of AVR microcontroller.
e) Explain Jumps and calls instructions with syntax.
f) List the features of on chip ADC of PIC microcontroller.
g) Write note on Instruction set of AVR microcontroller.
h) Write note of reset circuit of PIC microcontroller.

Q.3 Answer the following. (Any Three) **12**

a) Compare PIC and AVR microcontroller.
b) Explain On chip ADC of AVR microcontroller.
c) Explain clock and reset circuit of AVR microcontroller.
d) Write note on Compare capture mode.

Q.4 Answer the following. (Any Two) **12**

a) Write note on universal asynchronous receiver and transmitter of AVR microcontroller.
b) Explain interfacing of opto-coupler to AVR microcontroller.
c) Write a note on watchdog timer.

Q.5 Answer the following. (Any Two) **12**

a) Explain the Timers of PIC Microcontrollers.
b) Explain the temperature controlling system with suitable diagram.
c) Explain the W-register and Status register of PIC microcontroller.

SLR-HJ-2

Seat No.	

Set P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: March/April-2024
ELECTRONICS
Industrial Power Electronics (2313102)

Day & Date: Monday, 13-05-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) The figure to right indicate full marks.

Q.1 A) Select correct alternative for the following. **08**

1) Mc-Murray Bedford uses _____ commutation.
   a) Current b) either voltage or current
   c) voltage d) neither voltage nor current

2) In PWM technique the output voltage is controlled by changing _____.
   a) firing angle b) width of pulses
   c) extinction angle d) amplitude of I/P

3) Sinusoidal PWM has M.I. varying between _____.
   a) 0 to 1 b) 0 to 100
   c) 0 to 10 d) 0 to 0.1

4) _____ provide variable output voltage with fixed frequency.
   a) Cycloconverter b) inverter
   c) Chopper d) AC voltage controllers

5) Cycloconverter cannot not used in _____.
   a) AC voltage drives b) static VAR generation
   c) Induction heating d) DC operations

6) Input power factor for on- off controller is _____.
   a) $\mathrm{Vs.k}$ b) $\mathrm{Vs.}\sqrt{\mathrm{k}}$
   c) $\sqrt{k}$ d) k

7) The duty cycle of single phase full wave controller is _____.
   a) $(\frac{n}{n+m})$ b) $\sqrt{(\frac{n}{n+m})}$
   c) $\sqrt{(\frac{m}{n+m})}$ d) $(\frac{n}{m-n})$

8) semi converter has _____ quadrant operation.
   a) two b) three
   c) one d) four

B) Write True or False. **04**

1) Three phase full converter exhibits four quadrant operation.
2) Inverters can be used in standby power supply.
3) Cycloconverter uses capacitor to prevent failure.
4) Rectifier can be used for driving DC motors

Q.2 Answer the following. (Any Six) **12**

a) Explain the operation of class A chopper.
b) Give the classification of inverters.
c) State any two applications of AC voltage controllers.
d) Compare uncontrolled and controlled rectifiers.
e) Discuss the concept of phase control in AC voltage controllers.
f) Compare step up and step down cycloconverters.
g) Discuss the role of free w heeling diode in semi converters.
h) Enlist any two methods of power factor improvement in semi converters.

Q.3 Answer the following.(Any Three) **12**

a) Draw a neat labeled circuit diagram of three phase Dual converter.
b) Explain in brief AC choppers.
c) Discuss the working single phase dual converter.
d) Explain the operation of class E chopper.

Q.4 Answer the following.(Any Two) **12**

a) Explain the working of single phase unidirectional controller.
b) Discuss the working principle of inverter.
c) Explain the working of half controlled rectifier with resistive load.

Q.5 Answer the following.(Any Two) **12**

a) Discuss the working of three phase half controlled rectifier.
b) Explain the three phase half wave controllers with resistive load.
c) Describe the working of single phase half bridge inverter for resistive type load.

SLR-HJ-4

Seat No.	

Set P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: March/April-2024
ELECTRONICS
Numerical Methods (2313108)

Day & Date: Wednesday, 15-05-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All Questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **08**

1) The L(e^{at}-1/a) is _____.
   a) 1/s(s+a) b) 1/s(s-a)
   c) 1/(s-a) d) 1/(s+a)

2) _____ interpolation technique is a use finite difference.
   a) Newtons, forward differences interpolation method
   b) Newtons backward differences interpolation method
   c) Stirling's interpolation method based on central differences
   d) All of the mentioned

3) Cramer's Rule fails for _____.
   a) Determinant > 0 b) Determinant < 0
   c) Determinant $= 0$ d) Determinant =non-real

4) $\Delta^2 y_0 = \Delta(\Delta y_0)$ is _____.
   a) first order forward difference
   b) second order forward difference
   c) frist order backward difference
   d) second order backward difference

5) The LU method of factorization was introduced by the mathematician _____.
   a) Alan Tango b) David Hilbert
   c) G. W. Leibniz d) Alex Grothendieck

6) Trapezoidal rule is _____.
   a) Approximates f(x) by parabola
   b) Approximates f(x) by a 3rd order polynomial
   c) Approximates f(x) by straight line
   d) None of the mentioned

7) A matrix B and _____ will have the same determinant.
   a) Its adjoint b) Its inverse
   c) Its echelon matrix d) Its transpose

8) If $f(t) = t\sin(at)$ then its Laplace Transform $f(t)$ is _____.
   a) 2as $/(s^2 + a^2)^2$ b) $a/s^2 + a^2$
   c) Indeterminate d) $\sqrt{\pi}/2\sqrt{s}$

B) State True /False. **04**

1) Elimination process in Gauss Elimination method is also known as Forward Elimination.
2) If $f(t) = t^n$ where, 'n' is an integer greater than zero, then its Laplace Transform is t^{n+1}.
3) Simpson's $3/8$ rule is Approximates $f(x)$ by a 3rd order polynomial.
4) Rounding errors are generated when only required significant digits are considered and remaining are discarded.

Q.2 Answer the following. (Any Six) **12**

a) Write a note on pivoting.
b) What is backward substitution method?
c) What is Inverse Laplace transform?
d) Calculator absolute and relative errors, comment on the result. True value = 1×10^{-6}, approximate value=0.5×10^{-6}.
e) What are the different types of RK method?
f) Distinguish between interpolation and extrapolation.
g) What is error relative error?
h) What is matrix? What are the different types of the matrices?

Q.3 Answer the following. (Any Three) **12**

a) Find the Laplace transform of RC circuit in numerical analysis.
b) What is truncation error in series approximation?
c) Evaluate $1 = \int_1^{1.5} \frac{x}{y} dx$ using Simpson's 3/8 rule.
d) Find the inverse Laplace transform of $f(s) = \frac{s+2}{s2=2s+5}$

Q.4 Answer the following. (Any Two) **12**

a) Fit a curve of the form $y = \frac{x}{ax+b}$ for the data given below by the method of least squares.

x	2	4	6	8	10
y	8.8	13.7	17.0	18.9	20.4

b) State and prove property of periodic function.
c) Compute the value of the $I = \int_0^1 e^{-x}\, dx$ by using trapezoidal rule.

Q.5 Answer the following. (Any Two) **12**

a) If $F(t) = t^2, 0 < t < 2$ and $F(t+2) = F(t)$, find $L\{t\}$.
b) Write a note on T network. Find out the tridiagonal matrix for R-2R ladder network in numerical analysis.
c) Derive the expressions for least square fitting method by straight line.

SLR-HJ-5

Seat No.		Set	P

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: March/April-2024
ELECTRONICS
Research Methodology (2313103)

Day & Date: Friday, 17-05-2024 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All question compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose correct Answer. **08**

1) The Research is _____.
   a) Searching again and again
   b) Finding a solution to any problem
   c) Working in a Scientific way to search for the truth of any problem.
   d) None of the above

2) A research paper is a brief report of research work based on _____.
   a) Primary Data only
   b) Secondary Data only
   c) Both Primary and Secondary Data
   d) None of the above

3) Newton gave three basic laws of motion. This research is categorized as _____.
   a) Descriptive Research b) Sample Survey
   c) Fundamental Research d) Applied Research

4) The _____ are the two types of research data.
   a) Organised and unorganized data
   b) Qualitative and Quantitative data
   c) Processed and unprocessed data
   d) None of the above

5) Research objectives include _____.
   a) Decision making b) Build new concepts
   c) Eliminates old concepts d) Only a and b

6) Sample value is called _____.
   a) Parameter b) Statistic
   c) Variable d) Data

7) Research is a process of _____.
   a) Repeated search for facts
   b) Search for a problem
   c) Collecting primary and secondary data
   d) Preparing report on a problem

8) A null hypothesis is _____.
   a) When there is no difference between the variables.
   b) The same as research hypothesis
   c) Subjective in nature
   d) When there is difference between the variables.

B) State True/False. **04**

1) Research ethics do not include objectivity.
2) Primary data can be collected by the researcher himself.
3) Selection of appropriate method of data collection is based on nature object and scope of study.
4) Last stage of research process is analysis of data.

Q.2 Answer the following. (Any Six) **12**

a) Define the research.
b) What is the motivation in research?
c) State the features of research design.
d) State the components of research problem.
e) What are the categories of different research design?
f) State the characteristics of good data collection.
g) State the purpose of research report writing.
h) Define the hypothesis.

Q.3 Answer the following. (Any Three) **12**

a) Explain the qualitative research verses quantitative research.
b) Explain research methods and research methodology.
c) Write how research problem is formulated?
d) Explain the structure of thesis writing.

Q.4 Answer the following. (Any Two) **12**

a) Explain the research process in brief.
b) What are the types of research design? Explain it.
c) What are the types of data analysis? And explain it.

Q.5 Answer the following. (Any Two) **12**

a) What is primary data collection? Explain it in detail.
b) Explain the techniques involved in defining a problem.
c) Explain the format of research paper writing.

SLR-HJ-6

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS
Numerical Methods (MSC21101)

Day & Date: Friday, 10-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. **10**

1) Trapezoidal rule is _____.
   a) Approximates $f(x)$ by parabola
   b) Approximates $f(x)$ by a 3^{rd} order polynomial
   c) Approximates $f(x)$ by straight line
   d) None of the mentioned

2) The LU method of factorization was introduced by the mathematician _____.
   a) Alan Tango b) David Hilbert
   c) G. W. Leibniz d) Alex Grothendieck

3) Energy per unit charge is _____.
   a) Power b) Voltage
   c) Current d) Capacitance

4) _____ is the examples of the Iterative methods.
   a) Gauss seidel b) Gauss elimination
   c) Gauss Jordan d) All of the mentioned

5) A matrix B and _____ will have the same determinant.
   a) Its adjoint b) Its inverse
   c) Its echelon matrix d) Its transpose

6) Cramer's Rule fails for _____.
   a) Determinant > 0 b) Determinant < 0
   c) Determinant $= 0$ d) Determinant $=$ non-real

7) If $f(t) = t\sin(at)$ then its Laplace Transform $f(t)$ is _____.
   a) $2as/(s^2 + a^2)^2$ b) $a/s^2 + a^2$
   c) Indeterminate d) $\sqrt{\pi}/2\sqrt{s}$

8) Round the given number to decimal places: 24.5431 the number is _____.
   a) 24.5431 b) 24.543
   c) 24.55 d) 24.54

9) _____ is the direct method.
   a) Gauss elimination b) Gauss Jordan
   c) Backward substitution d) All of the mentioned

10) The value of f at $x_{i+1} + 1$ is same as its value at x_i is called _____.
   a) Zero-order approximation b) first-order approximation
   c) second-order approximation d) all of the mentioned

B) State true/false. **06**

1) $\Delta^2 y_0 = \Delta(\Delta y_0)$ is second order forward difference.
2) Simpson's Rule used for solution of system of linear equations.
3) In triangularization method $LZ = B$ equation is solved for Z
4) Laplace transform of integral function is $s[f(s) + f(0)]$
5) The Laplace Transform of the function $f(x) = x\ is\ 1/p^2, p > 0$
6) Relative error(e_r) = Absolute error/ true value.

Q.2 Answer the following. **16**

1) What is Matrix? Explain different types of the matrix.
2) Find $L^{-1}\{1/(s-2) + 2/(s+5) + 6/s^4\}$
3) Prepare divided difference table for following data.

x	2	4	5	7	8
y	3	43	138	778	1515

4) What is error? Explain truncation error and rounding error.

Q.3 a) Dividing interval into 5 points find the integration of a function $I = \int_0^2 x^2\, dx$ by using both trapezoidal rule and Simpson's rule. **10**

b) Prove that the existence of the Laplace transform $\int_{t0}^{\infty} e^{-st} f(t).dt$ exists where $s > a$. **06**

Q.4 a) Explain forward and backward substitution method. Solve the system of equation using forward substitution method. **10**

$5x - y + z = 10$
$2x + 4y = 12$
$X + y + 5z = -1$

b) Prove that $L^{-1}\{p/p^2 - 2p + 2)(p^2 + 2p + 2)\} = 1/2(\sin t)(\sin ht)$ **06**

Q.5 a) Find the value of $\sin(0)$ and $\sin(18)$ by using fallowing set of points. **08**

θ	0	10	20	30	40

b) Derive the expressions for least square fitting method by straight line. **08**
Derivation of $a\sum x + nb = \sum y$

$$a\sum x^2 + b\sum x_i = \sum xy$$

Q.6 a) What is error? Explain Absolute error and Relative error and calculate absolute and relative errors, comment on the result.

i) True value $= 1 \times 10^{-6}$, approximate value $= 0.5 \times 10^{-6}$ **08**
ii) True value $= 1 \times 10^{6}$, approximate value $= 0.99 \times 10^{6}$

b) Write a note on curve fitting? Derive the equation for second order least square fitting. **08**

Q.7 a) Prove that initial value theorem and find out Laplace transform of the LT. **10**

b) Write a note on LT. Find $L\{e^{-t}(3\sin h2t - 5\cos h2t)\}$ **06**

SLR-HJ-7

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS
Instrumentation Design (MSC21102)

Day & Date: Monday, 13-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Data logger displays the data in the form of _____.
   a) Analog b) Digital
   c) Both a and b d) None of the mentioned

2) A _____ is an instrument which gives a graphic record of the relationship between two variables.
   a) X-Y recorder b) X-T recorder
   c) Both a and b d) None of the mentioned

3) The V to I converted with floating load the operational amplifier connected in _____ mode.
   a) Inverting b) Non-inverting
   c) Differential d) All of these

4) The popular Digital Panel Meter (DPM) is well known example of _____ data accusation system.
   a) Single b) Dual
   c) Multi d) None of these

5) In NLC type of Liquid Crystal Display molecules are _____ align.
   a) Orderly b) Randomly
   c) Both a and b d) None of the mentioned

6) For AC as well as DC signal conditioning _____ IC is used.
   a) IC 2B35 b) IC 2B30
   c) IC 2B20 d) IC 2B31

7) Gauge factor may be defined as the ratio of change in _____ with respect to the change in the length.
   a) Length b) Distance
   c) Resistance d) None of these

8) In case of 4 to 20mA current transmission the full scale current span is _____.
   a) 0 to 20mA b) 20mA
   c) 16mA d) 24mA

9) A set of criteria that provide meaningful description of measurements under _____ conditions are called as static characteristics.
   a) Dynamic b) Static
   c) Working d) Environmental

10) The branch of engineering which deals with various types of instruments to record, monitor, indicate and control various physical parameter such as pressure, temperature is called as _____ system.
a) Communication b) Instrumentation
c) both a and b d) digital

B) State true or false. **06**

1) Temperature compensation, in bridge circuit arrangement, is affected by using dummy strain gauges.
2) The AD524 is input for both powers-on and power-off fault conditions.
3) For the sensitive and accurate measurements offsetting and linearzing is necessary.
4) The noise caused due to EM waves is called as EM noise.
5) The LVDT is based on principle of magnetic induction.
6) Piezoelectric crystals are used for measurement of static changes.

Q.2 Answer the following. **16**

a) Explain digital display unit LCD.
b) What is an X-Y recorder? Explain its application.
c) Write a short note on selection criteria for transducers.
d) Write a short note on Hall Effect.

Q.3 Answer the following.

a) What is instrumentation system? Design instrumentation system for measurement of humidity. **08**
b) Explain construction and working principle of LVDT. **08**

Q.4 Answer the following.

a) What is a signal conditioners? Explains model 2B30 and model 2B35. **10**
b) What is isolation amplifier? Explain model 289. **06**

Q.5 Answer the following.

a) Explain signal transmission in detail. **08**
b) Explain the interfacing circuit for PT100 and AD590 to microcontroller. **08**

Q.6 Answer the following.

a) What is mean by recorders? Explains in details its types. **08**
b) Explain static and dynamic characteristics of sensor. **08**

Q.7 Answer the following.

a) Explain in detail noise effect guarding techniques. **10**
b) Explain AC bridges. **06**

SLR-HJ-8

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS
Power Electronics (MSC21103)

Day & Date: Wednesday, 15-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Select correct alternative for the following. **10**

1) _____ of the following can replace the thyristor family device SCR.
   a) GTO b) TRIAC
   c) DIAC d) Diode

2) Class A chopper operates as _____.
   a) Cycloconverter b) AC voltage controller
   c) An inverter d) Rectifier

3) The 3ϕ unidirectional controller has _____ thyristors.
   a) 4 b) 6
   c) 3 d) 2

4) _____ of the following is not required in a single-phase dual converter.
   a) Current limiting reactor b) Thyristor
   c) AC source d) Free-wheeling diode

5) Step up chopper has _____.
   a) $\mathrm{fo} > \mathrm{fs}$ b) $\mathrm{Vout} > \mathrm{Vin}$
   c) $\mathrm{fo} < \mathrm{fs}$ d) $\mathrm{Vout} < \mathrm{Vin}$

6) In single phase half wave rectifier maximum Vdc is obtained with α =__.
   a) $\pi/2$ b) π
   c) 0 d) $\pi/4$

7) The duty cycle of the integral cycle control is _____.
   a) k b) $\sqrt{\mathrm{k}}$
   c) k/2 d) k2

8) The basic circuit arrangement of CSI consists of _____ at input.
   a) dc source with R b) dc source with R-L pair
   c) dc source with R-R pair d) dc source with L

9) Cycloconverter uses _____ to prevent failure
   a) resistor b) reactor
   c) diode d) capacitor

10) Bidirectional ac voltage controller uses the principle of _____control.
   a) input b) amplitude
   c) phase d) output

B) Write True or False. **06**

1) Three phase full converter exhibits four quadrant operation.
2) Bidirectional ac voltage controller uses the principle of phase control.
3) Class E chopper has four quadrant operation.
4) Dual converter exhibits two quadrant operation.
5) Rectifier can be used for driving DC motors.
6) Class C chopper exhibits one quadrant operation.

Q.2 Answer the following. **16**

a) Explain the operation of class C chopper.
b) Justify the role of firing angle for maximum output.
c) Compare AC and DC chopper.
d) Define the terms firing angle and extinction angle of a thyristor.

Q.3 Answer the following.

a) 1) Explain the working principle of inverter. **10**
2) Draw the circuit diagram of a single-phase dual converter.
b) Explain the working of single-phase bidirectional controller. **06**

Q.4 Answer the following.

a) 1) Discuss the working principle of cycloconverter. **10**
2) Explain the time ratio control technique in choppers.
b) Explain the time ratio control technique of chopper. **06**

Q.5 Answer the following.

a) 1) Discuss the working of single-phase half-controlled rectifiers. **10**
2) Explain the working of three phase half wave AC voltage controllers.
b) Compare step up and step down cycloconverters. **06**

Q.6 Answer the following.

a) 1) Draw the circuit diagram of Mc-Murray half bridge inverter. **10**
2) Discuss the need of free-wheeling diode in semi converter.
b) Discuss the classification of inverters. **06**

Q.7 Answer the following.

a) 1) Discuss the Mc-Murrey-Bedford half bridge inverter. **10**
2) Discuss the working of single-phase bridge inverter.
b) Discuss the concept of phase control in AC voltage controllers. **06**

SLR-HJ-9

Seat No.	

Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS
Advanced Microcontrollers (MSC21108)

Day & Date: Friday, 17-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) The 16F877 support _____ interrupt source.
   a) 15 b) 32
   c) 14 d) 16

2) Which flags of status register are most likely to get affected by the single-cycle increment and decrement instructions?
   a) P Flags b) C Flags
   c) OV Flags d) Z Flags

3) What does UART stand for?
   a) universal asynchronous receiver transmitter
   b) unique asynchronous receiver transmitter
   c) universal address receiver transmitter
   d) unique address receiver transmitter

4) Which instruction is applicable to set any bit while performing bitwise operation settings?
   a) bcf b) bsf
   c) bst d) Both a and b

5) In AVR, when is the V flag set?
   a) there is a carry from D7 bit
   b) there is a carry from D6 to D7 bit
   c) when carry is generated only from D3 to D4
   d) both a and c

6) ADLAR bit of ADMUX register is high to _____ the result.
   a) left adjust b) right adjust
   c) fix 8 bit d) both b and c

7) Which of the following has a Harvard architecture?
   a) EDSAC b) SSEM
   c) PIC d) CSIRAC

8) In AVR _____, _____are used as Y-pointer Registers.
   a) R26, R27 b) R28, R29
   c) R30, R31 d) R0, R1

9) Which bits play a crucial role in specifying the details or reasons associated with the system wake-up in WDT?
   a) $\overline{PD}$ & $\overline{TO}$ b) C & Z
   c) DC & RPO d) All of the above

10) Which of the following function used for header files?
a) file b) #include
c) struct() d) proc()

B) State true or false. **06**

1) The Port A of ATmega8 is an 10-bit bi-directional I/O port with internal pull-up resistors.
2) The AVR core combines a rich instruction set with 32 general purpose working registers.
3) The PIC16F877A have 8 Registers Banks.
4) The Status register of PIC16F877A contains the arithmetic status of the ALU, the Reset status and the bank select bits for data memory.
5) PINB Register of PIC is used to configure port B direction as Input or Output.
6) The ATmega8 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture.

Q.2 Answer the following. **16**

a) Write note on types of the RESET of AVR Microcontroller.
b) Write any Eight Salient features of AVR.
c) Draw LCD interfacing circuit diagram with PIC Microcontroller.
d) Write not on Register banks of PIC Microcontroller.

Q.3 a) Explain universal asynchronous receiver and transmitter of AVR Microcontroller. **10**
b) Explain Status Register of PIC Microcontroller. **06**

Q.4 a) Draw the architecture of AVR microcontroller and explain in details. **10**
b) Write note on watchdog timer. **06**

Q.5 a) Explain IO ports of 16F877 in detail. **10**
b) Explain interfacing of Opto-coupler to Microcontroller with suitable diagram and program. **06**

Q.6 a) Explain temperature sensor interfacing with PIC. **10**
b) Explain any two Arithmetic instructions of AVR Microcontroller. **06**

Q.7 a) Explain On chip ADC of PIC with suitable block diagram. **08**
b) Draw the power supply, Reset circuit and clock circuit of PIC Microcontroller **08**

SLR-HJ-11

Seat No.	

Set P

M.Sc. (Semester - II) (New) (NEP CBCS) Examination: March/April-2024
ELECTRONICS
Modern Control Theory (2313201)

Day & Date: Thursday, 09-05-2024 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

Instructions: 1) All questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives from the options. **08**

1) Regenerative feedback implies feedback with _____.
   a) oscillations b) step input
   c) negative sign d) positive sign

2) The _____ increases the steady state accuracy.
   a) Integrator b) Differentiator
   c) Phase lead compensator d) Phase lag compensator

3) The _____ is an open loop control system.
   a) Ward Leonard control b) Field controlled D.C. motor
   c) Stroboscope d) Metaldyne

4) Which of the following should be done to make an unstable system stable?
   a) The gain of the system should be decreased
   b) The gain of the system should be increased
   c) The number of poles to the loop transfer function should be increased
   d) The number of zeros to the loop transfer function should be increased

5) Transfer function of a system is used to calculate which of the following?
   a) The order of the system
   b) The time constant
   c) The output for any given input
   d) The steady state gain

6) Zero initial condition for a system means _____.
   a) input reference signal is zero
   b) zero stored energy
   c) initial movement of moving parts
   d) system is at rest and no energy is stored in any of its components

7) An automatic toaster is a _____ loop control system.
   a) open b) closed
   c) partially closed d) any of the above

8) In an open loop control system _____.
   a) Output is independent of control input
   b) Output is dependent on control input
   c) Only system parameters have effect on the control output
   d) None of the above

B) State True or False: **04**

1) In frequency domain analysis, the frequency of input signal should vary from 0 to ∞.
2) Nyquist polar plots are not suitable to express the stability of the system.
3) Feedback control is commonly used in industrial processes to continuously monitor the system's output and adjust the control action accordingly.
4) In industrial process control, only manual control strategies are used, and automated control is not common practice.

Q.2 Answer the following. (Any Six) **12**

a) State any two properties of Signal flow graph.
b) Define system stability.
c) List the use of transfer function.
d) Compare open loop and close loop control system.
e) Define Steady state errors.
f) List the advantages of signal flow graphs in control system.
g) Define Bode plots.
h) Write note on Control actions.

Q.3 Answer the following. (Any Three) **12**

a) State Transient response of the first order systems.
b) Explain all pass and minimum phase system.
c) Define source node, sink node, chain node and forward path of SFG.
d) Compare PI and PD system.

Q.4 Answer the following. (Any Two) **12**

a) Derive an expression for steady state error for step and ramp input.
b) Explain PID control system with suitable example.
c) Explain the Concept of poles and zeros with suitable example.

Q.5 Answer the following. (Any Two) **12**

a) With suitable example describe the Root Locus of any control system.
b) Write a note on Hurwitz Criterion on the stability.
c) With suitable example describe the closed loop control system.

SLR-HJ-12

Seat No.	

Set P

M.Sc. (Semester - II) (New) (NEP CBCS) Examination: March/April-2024
ELECTRONICS
Real Time Operating System (2313202)

Day & Date: Saturday, 11-05-2024 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

Instructions: 1) All Questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **08**

1) AVR ATmega8L microcontroller has _____ Internal SRAM.
   a) 1Kbyte b) 2Kbyte
   c) 3 Kbyte d) 4Kbyte

2) In which scheduling certain amount of CPU time is allocated to each process?
   a) earliest deadline first scheduling
   b) proportional share scheduling
   c) equal share scheduling
   d) None of the mentioned

3) Preemptive, priority based scheduling guarantees _____.
   a) hard real time functionality
   b) protection of memory
   c) soft real time functionality
   d) None of the mentioned

4) In a _____ real time system, it is guaranteed that critical real time tasks will be completed within their deadlines.
   a) soft b) critical
   c) hard d) None of the mentioned

5) Mailbox is a kernel object used for _____ communication.
   a) Serial b) Full duplex
   c) Parallel d) Intertask

6) On Linux which of the following is not a valid file type.
   a) Inode b) Socket
   c) Softlinked d) FIFO

7) For semaphores and binary semaphores, a _____ is used to hold processes waiting on the semaphore.
   a) Stack b) Queue
   c) Tree d) Graph

8) What is FIFO algorithm?
   a) first executes the job that came in last in the queue
   b) first executes the job that came in first in the queue
   c) first executes the job that needs minimal processor
   d) first executes the job that has maximum processor needs

B) State True or False. **04**

1) Real time systems must have preemptive kernels.
2) Hard real time operating system has less jitter than a soft real time operating system.
3) Time quantum is defined in multilevel queue scheduling algorithm.
4) The problem of priority inversion can be solved by priority inversion protocol.

Q.2 Answer the following. (Any Six) **12**

a) Explain software and hardware time ticks.
b) Write Characteristics of Real-Time operation system.
c) Draw AVR ATmega8L microcontroller based embedded systems for Measurement of pH measurement.
d) Explain Priority inversion.
e) What is the standard form of RTOS?
f) Compare Hard and Soft Real Time Systems.
g) Draw Reset circuit of AVR ATmega 8L.
h) Explain Structure of embedded system.

Q.3 Answer the following. (Any Three) **12**

a) Write note on Scheduling Algorithm.
b) Discuss RTLinux Kernel in detail.
c) Write note on Minimum requirement of Microcontroller based embedded system with suitable diagram.
d) Write a note on task and task structure.

Q.4 Answer the following. (Any Two) **12**

a) Write Simple programs based on RTOS for Intertask communication.
b) Explain in detail structure of RTOS.
c) Explain in detail concept of semaphore.

Q.5 Answer the following. (Any Two) **12**

a) Design AVR ATmega8L microcontroller based embedded system for Measurement of pH.
b) Discuss RTLinux Kernel in detail.
c) Write note on Concept of Scheduling Algorithm.

SLR-HJ-13

Seat No.	

Set P

M.Sc. (Semester - II) (New) (NEP CBCS) Examination: March/April-2024
ELECTRONICS
Signals and System (2313207)

Day & Date: Tuesday, 14-05-2024 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

Instructions: 1) All Questions are Compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. **08**

1) In the following conditions _____ condition is true.
   a) odd function x odd function = odd function
   b) odd function x even function = odd function
   c) even function x even function = odd function
   d) odd function x odd function = even function

2) _____ theorem states that the total average power of a periodic signal is equal to the sum of average powers of the individual Fourier coefficients.
   a) Parseval's Theorem b) Rayleigh's Theorem
   c) Both a and b d) None of the mentioned

3) The extension of script files is _____.
   a) .script
   b) .m
   c) .mat
   d) There is a nothing called script file

4) The system characterized by the equation y(t) = ax(t) + b is _____.
   a) linear for any value of b b) linear if b > 0
   c) linear if b < 0 d) non-linear

5) If G(f) represents the Fourier Transform of a signal g(t) which is real and odd symmetric in time, then G(f) is _____.
   a) Complex b) Imaginary
   c) Real d) Real and non-negative

6) _____ are the crucial purposes of using the Fourier Transform while analyzing any elementary signals at different frequencies.
   a) Transformation from time domain to frequency domain
   b) Plotting of amplitude & phase spectrum
   c) Both a & b
   d) None of the mentioned

7) A triangular function $\Delta_a(t)=1-|t|/a$ for _____.
   a) $|t|<1$ b) $|t|<a$
   c) $|t|\leq 1$ d) $|t|\leq a$

8) The condition of periodicity for a continuous time signal is _____.
   a) $x(t) = x(t + T_0)$ b) $x(n) = x(n + N)$
   c) $x(t) = e^{-at}$ d) None of these

B) State true/false. **04**

1) In Matlab figure window is also known as Graphics window.
2) For an LTI discrete system to be stable, the square sum of the impulse response should be Zero.
3) Sampling is done to convert a discrete time signal into continuous time signal.
4) If x(n)= cos(3πn) its fundamental period is N= 2 samples.

Q.2 Answer the following. (**Any Six**) **12**

a) Define power signal and write its types.
b) Check the given system is static or dynamic y(n)=n.x(n).
c) Represent given signal graphically x(n)= {1,2,0, -1,1}
d) What are the types of Matlab windows?
e) Define continuous valued and discrete valued signals.
f) What is system?
g) Compare multichannel and multidimensional signal.
h) What is signal processing?

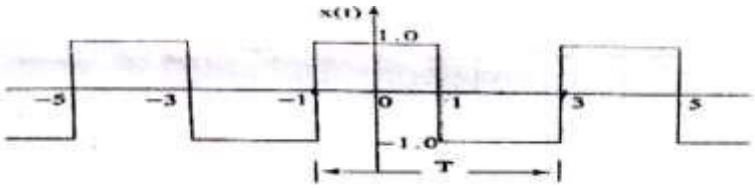
Q.3 Answer the following. (Any Three) **12**

a) Explain even and odd signals with its graphical representation.
b) Write a note on amplitude scaling operation.
c) Determine whether the given system is time invariant or not.
y(n)=x(-n)
d) Write a note on Dirichlet conditions.

Q.4 Answer the following. (Any Two) **12**

a) A discrete time signal is x(n) = {1,**1**,1,1,2}
↑

b) Find the trigonometric Fourier series for the periodic signal x(t) is shown in figure.



c) Explain time variance property of the system and how to decide whether the system is 1 time variant or not.

Q.5 Answer the following. (Any Two) **12**

a) Justify x(n)=$(0.5)^n$u(n). State whether it is an energy or power signal.
b) Explain y(n)=x(n)+nx(n+1) the system is linear or non-linear.
c) Explain exponential signal with its conditions and represent each condition graphically.

SLR-HJ-15

Seat No.	

Set P

M.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS
Control Theory (MSC21201)

Day & Date: Thursday, 09-05-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to 7.
3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative from the options. **10**

1) In SFG, the node having only outgoing branches is called _____.
a) Source node b) Sink node
c) Chain node d) Forward node

2) If a control system has one input and one output, it is termed as _____ system.
a) A single feedback b) SISO
c) SIMO d) MIMO

3) Transfer function of closed loop control system is given by _____.
a) $\mathrm{T.F.} = 1/\mathrm{G(s)H(s)}$ b) $\mathrm{TF} = 1 + \mathrm{G(s)H(s)}$
c) $\mathrm{TF} = 1/(1 + \mathrm{G(s)H(s)})$ d) $\mathrm{TF} = \mathrm{G(s)}/(1 + \mathrm{G(s)H(s)})$

4) If roots are on positive real axis of the S plane, then the system said to be _____.
a) Stable b) Unstable
c) Marginally stable d) None of these

5) _____ is a disadvantage of open loop system.
a) Simple construction b) Easy for maintenance
c) Simple Design d) Unreliability

6) For 2% tolerance, the settling is given by _____.
a) $\mathrm{Ts} = \xi\,\mathrm{wn}$ b) $\mathrm{Ts} = \xi/\mathrm{wn}$
c) $\mathrm{Ts} = 4/\xi\,\mathrm{wn}$ d) $\mathrm{Ts} = \xi/4\,\mathrm{wn}$

7) For system to be stable, the roots of characteristics equation should be _____.
a) On imaginary axis of the s-plane
b) At right half of the s-plane
c) At Origin of the s-plane
d) At left half of the s-plane

8) The node having only incoming branch is called _____ node.
a) Source b) Sink
c) Chain d) Feedback

9) For type 0 system, the steady state error for step input is given by ____.
a) $\mathrm{ess} = \mathrm{Kp}$ b) $\mathrm{ess} = 1/\mathrm{Kp}$
c) $\mathrm{ess} = 1/(1 + \mathrm{Kp})$ d) Infinity

10) If three gain blocks having gains $G1, G2$ and $G3$ are connected in series, then resulting gain of the system is _____.

a) $G1/(G2 + G3)$ b) $G1 \times G2 \times G3$

c) $G1 + G2 + G3$ d) $G1/G2/G3$

B) Write True or False. **06**

1) $f(x) = x^3$ is a linear system.
2) The graph of log magnitude against frequency is called Bode Plot.
3) Positive feedback signal improves delay of automatic control system.
4) In first step of reduction of block diagram single blocks are reduced.
5) According to Hurwitz's criterion, for sample all Hurwitz determinants should be positive.
6) Root locus technique gives quick transient and stability response.

Q.2 Answer the following. **16**

a) What do you mean by s-plane?
b) Define the terms Poles and Zeros of transfer function.
c) Compare open loop system and closed loop system.
d) Discuss the term stability of the system.

Q.3 Answer the following.

a) Discuss characteristics and application of Proportional control mode. **08**
b) What do you mean by stability of control system? Mentions types of stability. Explain in detail the effect of position of poles in s-plane on type of stability. **08**

Q.4 Answer the following.

a) Describe the effect of damping factor ξ on the transient response of the second order system. **10**
b) Write a note on semilog paper. **06**

Q.5 Answer the following.

a) Explain in detail methods of frequency domain. **08**
b) Compare the Block Diagram representation and Signal flow graph. **08**

Q.6 Answer the following.

a) Explain frequency responses specifications in detail. **08**
b) Define Steady State Error. Derive the derivation of the steady state error for a simple closed loop system. **08**

Q.7 Answer the following.

a) Describe in detail the Nyquist's criteria for the stability of the system. **10**
b) Give the advantages and features of Transfer function. **06**

SLR-HJ-16

Seat No.	

Set P

M.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS
Real Time Operating System (MSC21202)

Day & Date: Saturday, 11-05-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figures to right indicates full marks.

Q.1 A) Choose correct alternative. **10**

1) The priorities of low priority task and high priority task are effectively inversed is called _____.
   a) Priority inheritance b) priority inversion
   c) both a and b d) None of these

2) A semaphore: _____.
   a) is a binary mutex
   b) must be accessed from only one process
   c) can be accessed from multiple processes
   d) None of the mentioned

3) Which one of the following is not a valid state of a thread?
   a) running b) parsing
   c) ready d) blocked

4) Releasing binary or counting semaphores results in ____ the value or count.
   a) Incrementing b) Decrementing
   c) Equivalent d) None of these

5) Why for the 8 bit analog input we select Vref as the 2.56V?
   a) to obtain each degree count as the 2.56V
   b) to get 2.56V at the output
   c) to obtain each degree count as the 10mV
   d) to get 10mV as the output

6) A binary semaphore is a semaphore with integer values: ____
   a) 1 b) -1
   c) 0.8 d) 0.5

7) Which of the following is correct?
   a) MOSI has the same meaning as the SDO
   b) SCLK is used to initiate and terminate the data transfer
   c) In 3 wire SPI, there is only one pin for transmission and reception
   d) In 3 wire SPI, there are three pins MOSI, MISO and SCLK

8) In Preemptive multitasking the _____ priority task is always given the CPU time.
   a) Highest b) Lowest
   c) Equal d) None of these

9) Which of the following factors can affect the step size calculation?
   a) number of bits
   b) input current
   c) output current
   d) All of the mentioned

10) Thread synchronization is required because _____.
   a) all threads of a process share the same address space
   b) all threads of a process share the same global variables
   c) all threads of a process can share the same files
   d) all of the mentioned

B) Write True or False. **06**

1) Counting semaphore will have an integer value greater than zero.
2) In RTLinux you can pass the arguments from the command prompt.
3) Message queues and semaphores are not schedulable entities.
4) Operating system is link to interface the hardware and application programs.
5) Mailbox is a kernel object used for inter-task communication.
6) Acquiring a binary or counting semaphores result in incrementing the value or count.

Q.2 Answer the following. **16**

a) What are the different types of semaphores and where they are used?
b) Explain clock and reset circuit of AVR microcontroller.
c) Write Notes on Context Switching.
d) Explain the concept of embedded system.

Q.3 Answer the following. **16**

a) What is kernel? Compare Hard and Soft real time operating system.
b) Explain Characteristics of Real- Time operation system.

Q.4 Answer the following. **16**

a) Explain in detail RTLinux Kernel. Write a simple program on creation of threads.
b) Explain software and hardware time ticks.

Q.5 Answer the following. **16**

a) Write a note on task and task structure.
b) Design AVR ATmega8L microcontroller based embedded systems for Measurement of Humidity.

Q.6 Answer the following. **16**

a) Write note on Round Robin scheduling algorithm.
b) What do you mean by embedded system? Explain with suitable examples types of embedded system.

Q.7 Answer the following. **16**

a) Explain Services of Scheduler.
b) Explain in detail RTOS kernel object and Messages.

SLR-HJ-17

Seat No.	

Set P

M.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS
Opto Electronics (MSC21206)

Day & Date: Tuesday, 14-05-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct answer. **10**

1) Total internal reflection can take place when light travel from _____.
   a) Diamond to glass b) Water to glass
   c) Air to water d) Air to glass

2) A _____ is material or device that transmits only one polarization component and blocks the other.
   a) Polarizer b) Unpolarizer
   c) Both a and b d) None of these

3) The LASER is _____ source of light.
   a) Asynchronous b) Synchronous
   c) Coherent d) In coherent

4) Dispersion in silica fibers is minimum at λ = _____.
   a) 850 nm b) 1300 nm
   c) 1550 nm d) 750 nm

5) A laser diode _____.
   a) Produces always light of single wavelength.
   b) Produces always light of multiple wavelength
   c) Can be made to produce light of single and multiple wavelengths
   d) Produces visible light spectrum.

6) A fibers _____ is a permanent or semi-permanent joint between two fiber.
   a) Connector b) Coupling
   c) Splice d) Butt joint

7) The Faradays effect is employed in _____ devices.
   a) Magneto Optic b) Electro optic
   c) Magneto Electric d) Acousto optic

8) Scattering loss in optical fiber varies with wavelength as _____.
   a) $1/\lambda^2$ b) $1/\lambda^3$
   c) $1/\lambda^4$ d) $1/\lambda$

9) He-Ne laser is a _____ power device.
   a) Low b) High
   c) Medium d) None of these

10) Birefringent crystal have a property called _____.
   a) Refraction b) Reflection
   c) Polarization c) double refraction

B) State True of False. **06**

1) Photo detector is square low device.
2) Photo detector is square low device.
3) Glass having the highest refractive index.
4) Material dispersion of an optical fiber is vanishes if RI of core varies linearly with wavelength.
5) Extrinsic absorption by atomic defects in the glass composition.
6) Graded index can be used for multimode fiber optic communication.

Q.2 Answer the following. **16**

a) Compare step index fiber and graded index fiber.
b) Explain the LED.
c) Explain the cable design parameters.
d) Draw block diagram of optical fiber communication system.

Q.3 Answer the following. **16**

a) Explain the techniques of glass fiber fabrication.
b) What is modulation? Discuss intensity modulation with special reference to fiber optic instrumentation.

Q.4 Answer the following.

a) Discuss the working principle of PIN photo detector with physical structure, field distribution and energy diagram. **10**
b) With neat diagram explain propagation of light in optical fiber. **06**

Q.5 Answer the following.

a) Describe the loss mechanism. **08**
b) Describe the coupling of optical fiber. **08**

Q.6 Answer the following.

a) Explain the measurement of optical fiber. **08**
b) Describe the numerical aperture. **08**

Q.7 Answer the following.

a) Explain the working of pocket cell as modulator and Kerr modulator. **10**
b) Describe the pulse spread due to material dispersion in optical fiber. **06**

SLR-HJ-19

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
ELECTRONICS
Digital Signal Processing (MSC21301)

Day & Date: Friday, 10-05-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question Q.1 and Q.2 are compulsory.
2) Attempt any Three from Q.3 to Q.7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) The Fourier transform of real valued time signal has _____.
   a) Odd symmetry b) Even symmetry
   c) Conjugate symmetry d) No symmetry

2) What is the ROC of z-transform of finite duration anti-causal sequence?
   a) $Z = 0$
   b) $Z = \infty$
   c) Entire z-plane, except at $z = 0$
   d) Entire z-plane, except at $z = \infty$

3) Final value theorem is used for _____.
   a) All type of systems b) Stable systems
   c) Unstable systems d) marginally stable systems

4) Which of the following is the advantage of Hanning window over rectangular window?
   a) More side lobes b) More width of main lobe
   c) Less side lobes d) None of the mentioned

5) Which of the following should be done in order to convert a continuous-time signal to a discrete-time signal?
   a) Sampling b) Differentiating
   c) Integrating d) None of the mentioned

6) The ROC of the z-transform of a unite step function is _____.
   a) (real part of $z) < 0$ b) $|z| < 1$
   c) (real part of $z) > 0$ d) $|z| > 1$

7) If $x(n)$ is causal sequence then its initial value is _____.
   a) $x(0) = \lim z \to 0\, X(Z)$ b) $x(0) = \lim z \to \infty\, X(Z)$
   c) $x(\infty) = \lim z \to 1\, X(Z)$ d) $x(\infty) = \lim z \to 1\, X(Z)\,(1 - Z\text{^} - 1)$

8) The DFT of delayed unit impulse $\delta(n - n0)$ is _____.
   a) $e - j2\pi kn\ 0/N$ b) $ej2\pi kn\ 0/N$
   c) $ej\pi kn\ 0/N$ d) $e - j\pi kn\ 0/N$

9) What is the partial fraction expansion of the proper function $X(Z) = 1/(1 - 1.5z - 1 + 0.5z - 2)$?
   a) $2z/(z - 1) - z/(z + 0.5)$ b) $2z/(z - 1) + z/(z - 0.5)$
   c) $2z/(z + 1) - z/(z + 0.5)$ d) $2z/(z - 1) - z/(z - 0.5)$

10) Which of the following is a method for Implementing an FIR system?
   a) Direct form b) Cascade form
   c) Lattice structure d) All of the mentioned

B) State True or False. **06**

1) The region of convergence (ROC) of X(Z) is set for all the values of Z for which X(Z) attains a finite value.
2) The anti-symmetric condition with M even is not used in the design of high pass linear-phase FIR filter.
3) The property of twiddle factor is called as periodicity property.
4) The direct evaluation DFT requires N^2 complex multiplications.
5) Inverse Z transform by power series expansion is also called as indirect division method.
6) The FT of real valued time signal has no symmetry.

Q.2 Answer the following. **16**

a) Define Z transform. Explain region of convergence.
b) What is FT? Explain Existence of FT.
c) Differentiate between Z - transform and DFT.
d) What is DSP? What are the applications of DSP?

Q.3 **a)** What is FT? Explain FT of some standard signals. **08**
b) Find the linear convolution of $x_1(n)$ and $x_2(n)$using Z-transform **08**
$x_1(n) = \{1,2,3,4\}$ and $x_2(n) = \{1,2,0,2,1\}$
↑ ↑

Q.4 **a)** What is twiddle factor? Derive cyclic property of twiddle factor. **10**
b) Explain time reversal an Explain time reversal and frequency shifting properties of FT. **06**

Q.5 **a)** Prove that ideal filters are practically not realizable. **08**
b) State and prove Parseval's theorem of DFT. **08**

Q.6 **a)** What is Kaiser Window? Explain the procedure for designing an FIR filter using the Kaiser window. **08**
b) Explain PFE method with suitable example. **08**

Q.7 **a)** Determine the Z-transform of $x(n) = (\cos \omega_0\ n).u(n)$ **10**
b) Obtain IZT using residue method where $X(Z) = 1/(Z-1)(Z-3)$ **06**

SLR-HJ-20

Seat No.	

Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
ELECTRONICS
Advanced Digital Design with VHDL (MSC21302)

Day & Date: Monday, 13-05-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Select correct alternative for the following. **10**

1) Component instantiation is the part of _____ modeling.
   a) Behavior b) Component
   c) Dataflow d) Structural

2) In VHDL there are _____ types of shift operators.
   a) Three b) Four
   c) Five d) Six

3) The inputs in the PLD is given through _____.
   a) NAND gates b) OR gates
   c) NOR gates d) AND gates

4) Predefined data for an VHDL object is called _____.
   a) generic b) constant
   c) attribute d) library

5) Configurable logic blocks in FPGA are based on _____.
   a) Look up tables b) Programmable Interconnect
   c) Carry look ahead logic d) None of the above

6) Generics are declared in the _____ declaration part of a VHDL design.
   a) Port declaration b) Entity
   c) Component d) Configuration

7) PLA is used to implement _____.
   a) A complex sequential circuit b) A simple sequential circuit
   c) A complex combinational circuit d) A simple combinational circuit

8) Use of constants is to _____.
   a) Represent default value b) Represent local information
   c) Represent wires d) Pass value between entities

9) The package std_logic _1164 is accessed by _____ clause.
   a) library b) use
   c) both a & b d) type

10) 'shift_reg' is used for initialize the _____ in the shift register.
   a) LSB b) MSB
   c) Register type d) Register bits

B) Write True or False. **06**

1) Structural style use processes.
2) The '&' adding operator used in VHDL.
3) The declarative part of the architecture contains declaration of local signals, constant or subprogram.
4) The PLD devices are utilized for analog circuit design.
5) Xilinx ISE is not an EDA tool.
6) The front end design is used to create logic source of design.

Q.2 Answer the following. **16**

a) Write a note on Macrocell.
b) Explain the advantages of VHDL.
c) Describe the operators in the VHDL.
d) Explain the entity using controlled inverter.

Q.3 Answer the following.

a) Write VHDL code for 1:8 Dmux using behavioral modeling. **08**
b) Classify the PLD devices. Explain the architecture of CPLD. **08**

Q.4 Answer the following.

a) Explain the Attributes and Generic for VHDL. **10**
b) Write VHDL code for 8 to 3 encoder. **06**

Q.5 Answer the following.

a) Explain the IF statement in detail with suitable example. **08**
b) Explain the role of Library in VHDL, Write VHDL code for parallel in serial out shift register. **08**

Q.6 Answer the following.

a) Explain the PLD design flow for IC fabrication. Example the EDA tools for PLD. **08**
b) Explain the SPLD in detail with suitable diagram. **08**

Q.7 Answer the following.

a) Explain the various types of architecture bodies for VHDL with suitable example. **10**
b) Write VHDL code for D flip flop using wait statement. **06**

SLR-HJ-21

Seat No.		Set	P

M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
ELECTRONICS
ARM Microcontroller and System Design (MSC21306)

Day & Date: Wednesday, 15-05-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) The ARM 7TDMI-S processor has _____ types of memory cycle.
   a) 4 b) 3
   c) 5 d) 2

2) Pipelining stages of ARM include _____.
   a) Fetch, Decode, Write
   b) Fetch, Decode, Execute
   c) Fetch, Execute Write
   d) Fetch, Decode, Execute, write

3) The LPC 2148 is equipped with USB device controller that enables _____ M bit/s data exchange with USB host controller.
   a) 3 b) 6
   c) 12 d) 24

4) Cortex M3 processor consist of _____ pipeline.
   a) 2 stage b) 3 stage
   c) 4 stage d) 5 stage

5) Special type of ROM in microcontroller which can be reprogrammed many times, typically for storing program code, is _____.
   a) RAM b) SRAM
   c) Flash memory d) Cache memory

6) The main importance of ARM micro-processors is providing operation with _____.
   a) Low cost and low power consumption
   b) Higher degree of multi-tasking
   c) Lower error or glitches
   d) Efficient memory management

7) In branch instructions of ARM, mnemonic BVC imply _____.
   a) overflow set b) carry set
   c) carry clear d) overflow clear

8) In LPC 2148. which among the following is/are the functions of Mask register?
   a) Byte addressability
   b) Relocation to ARM local bus for fastest possible I/O timing
   c) Treating sets of port bits in the form of group without changing other bits
   d) All of the above

9) Interworking uses _____ and _____ instruction to change the stale and jump to a specific routine.
   a) BX, BLX b) PUSH, POP
   c) Both a and b d) None of these

10) In LPC 2148, on-chip flash memory is about _____.
   a) 32-512KB b) 8-40 KB
   c) 4-20 KB d) 1-8 KB

B) State True or False. **06**

1) In ARM 7 TDMI T, D, M, I Stands for Timer, Delay, Multiplex, Interrupt.
2) Abort mode generally enters when low priority interrupt is raised.
3) When subroutine is called processor, stores return address in program counter.
4) LSL is a load-store instruction.
5) USB 2.0 full speed compliant device controller with 8Kb of end point RAM.
6) In ARM, PC is implemented using General purpose register.

Q.2 Answer the following. **16**

a) What is ARM processor? Give its applications.
b) Write a note on pipelining in ARM processor.
c) Define Embedded System with example.
d) State the data types supported by ARM processors.

Q.3 Answer the following.

a) Explain in detail architecture of ARM LPC2148 with neat labeled diagram. **08**
b) What do you mean by banked and unbanked registers in ARM processor? Compare Cortex-A, Cortex-M, Cortex-R Processors. **08**

Q.4 Answer the following.

a) Design embedded system for measurement of temperature using ARM microprocessor and explain it. Write algorithm for same. **08**
b) Explain different operating modes? Which registers is used to select operating modes? **08**

Q.5 Answer the following.

a) Explain instruction set used in ARM processor. **08**
b) Write a note on Ethernet and UART. **08**

Q.6 Answer the following.

a) Write embedded c program to interface opto couplers to ARM microprocessor with interfacing diagram. **08**
b) Write the features of ARM processes. Explain general purpose DMA controller of LPC 2378. **08**

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Q.7 Answer the following.

a) What is barrel shifter? How does it increase the speed of execution in ARM processor? **08**
b) What is RISC architecture? Explain the advantages and disadvantages of RISC architecture. **08**

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
ELECTRONICS
Microwave Devices, Antennas and Measurements (MSC21401)

Day & Date: Thursday, 09-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7.
3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives from the given options. **10**

1) Smith chart is based on the polar plot of _____.
   a) Reactance b) Voltage
   c) Current d) Voltage reflection co-efficient

2) Polarization of EM wave is in _____.
   a) the direction of electric field
   b) the direction of magnetic field
   c) the directions of electric and magnetic field
   d) None of the mentioned

3) The power gain of a half wave dipole with respect to an isotropic radiator is _____.
   a) 1 db b) 2.15 db
   c) 3 db d) 6 db

4) The Electromagnetic wave inside a waveguide have infinite number of field patterns called as _____.
   a) modes b) patterns
   c) both a) and b) d) None of the mentioned

5) In a _____ oscillator, the RF wave travels along the helix from the collector towards the electron gun.
   a) Interaction oscillator b) Magnetrons
   c) Backward wave oscillator d) None of the mentioned

6) For co-axial lines and waveguides, _____ is more preferred.
   a) Open circuited stub
   b) Short circuited stub
   c) Slotted section
   d) Co-axial lines cannot be impedance matched

7) When a load Z_L is matched to a line, the value of standing wave ratio is _____.
   a) 1
   b) 0
   c) infinity
   d) insufficient data to calculate SWR

8) If $Hz = 0$ but $Ez \neq 0$ is called _____ mode.
   a) TE mode b) TH mode
   c) TEM mode d) None of the mentioned

9) _____ material is used in the fabrication of GUNN diodes because it has less forbidden energy gap.
   a) germanium b) silicon
   c) cadmium selenide d) gallium arsenide

10) In transverse magnetic waves, _____.
   a) E is parallel to H
   b) H is parallel to wave direction
   c) H is transverse to wave direction
   d) E is transverse to H

B) State True or False. **06**

1) The electrodes of a Gunn diode are made of molybdenum.
2) Scattering matrix for a reciprocal network is identity matrix.
3) The Gauss law employs Maxwell's equation for the calculation of charge density.
4) The klystron tube used in a klystron amplifier is a linear type beam amplifier.
5) The dominant wave should have highest cut-off frequency.
6) Strip lines are not a type TEM line used in microwave networks.

Q.2 Answer the following. **16**

a) Write a note on impedance matching.
b) Define S-matrix and its properties.
c) Explain Crystal rectifiers.
d) What is waveguide? Write its features.

Q.3 a) A transmission line has following parameters, $\mathrm{R} = 2\Omega\mathrm{m}$. $\mathrm{G} = 0.5\ \mathrm{m}\mho/\mathrm{m}$, $\mathrm{F} = 1\mathrm{GHz}$, $\mathrm{L} = 8\mathrm{nH/m}$, $\mathrm{C} = 0.23\mathrm{pF}$ calculate, **10**

1) Characteristics impedance
2) Propagation constant

b) Write a note on Lossy dielectric material. **06**

Q.4 a) Explain circular function. Derive the expression for circular function. **08**
b) Explain LSA Diode and InP diode. **08**

Q.5 a) Explain Modes in waveguides. Derive the wave equation for TE and TM waves. **10**
b) What is antenna? Explain Horn Antenna. **06**

Q.6 a) Explain Waveguide Microwave Junction. And calculate the Scattering matrix. **08**
b) Explain Reflex Klystrons tube and RWH theory. **08**

Q.7 a) What is SWR? Explain SWR of impedance and admittance. **10**
b) Explain double stub matching technique. **06**

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
ELECTRONICS
Networking and data communications (MSC21402)

Day & Date: Saturday, 11-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) A port address in TCP/IP is of _____ bits.
   a) 10 b) 8
   c) 12 d) 16

2) OSI model consists of _____ layers.
   a) 4 b) 7
   c) 6 d) 5

3) A HTTP request message always contains a request line and a _____.
   a) body b) information
   c) header d) status line

4) An IPv4 address has a length of ____ bits.
   a) 32 b) 16
   c) 64 d) 8

5) Process to process delivery of the data packet is done by _____ layer.
   a) session b) presentation
   c) application d) transport

6) A Bluetooth device is limited to a range of _____.
   a) 1m b) 5m
   c) 10m d) 20m

7) The transmission of a digital signal without modulation is _____.
   a) broadband b) baseband
   c) digital d) digital band

8) A router usually routes the data packet based on _____ address.
   a) port b) logical
   c) specific d) physical

9) ____ is not a multiplexing technique.
   a) AM b) TDM
   c) FDM d) WDM

10) Fiber optic cable is advantageous over metallic cable because of higher _____.
   a) installation cost b) resistance
   c) bandwidth d) maintenance

B) Write True or False. **06**

1) Flag field of an HDLC frame is 11111111.
2) Use of guard band prevents signal overlapping in FDM.
3) DSL modulation technique is used for ADSL.
4) Free space is not a guided transmission medium.
5) Standard Ethernet provides data rate of 20 Mbps.
6) Data framing is not a responsibility of the data link layer of the OSI model.

Q.2 Answer the following. **16**

a) Explain the domain name system.
b) Describe IPv6 Addresses.
c) Explain SMTP.
d) Write a note on Bluetooth technology.

Q.3 Answer the following. **16**

a) What is mean by Network? Explain categories of Network.
b) Explain WWW and HTTP.

Q.4 Answer the following. **16**

a) Describe DNS in the internet.
b) Write a note on stop and wait ARQ protocol.

Q.5 Answer the following. **16**

a) Explain role of cryptography in networking.
b) Explain in detail PPP.

Q.6 Answer the following. **16**

a) Discuss the OSI model in detail.
b) Explain ATM technology.

Q.7 Answer the following. **16**

a) Describe the Addressing of TCP/IP.
b) Write a note on SMTP and HTMP.

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
ELECTRONICS
Nanoelectronics (MSC21403)

Day & Date: Tuesday, 14-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Answer. **10**

1) In case of Type I multiple quantum well (MQW) the wells for hole and electron are located in the _____ space location.
   a) alternate b) same
   c) different d) triangular

2) In _____ lithography, a film of water or another dielectric medium is inserted in between the lens and wafer.
   a) Optical b) Electron beam
   c) Immersion d) Ultraviolet

3) The OLED's are an electroluminescent organic material between two _____ of different work functions.
   a) Semiconductors b) Nonconductors
   c) Insulator d) Conductors

4) If characteristics $\lambda \geq Lx\ and Lx << Lz, Ly$ then it stands for quantum _____.
   a) Dot b) Wire
   c) Well d) Artificial

5) The SiGe heterojunctions have _____ lattice constant difference between Si and Ge, which is about 4%.
   a) Small b) Large
   c) Equal d) None of these

6) For a _____ photoresist, the resist material is initially insoluble and through a chemical reaction when exposed to light it become soluble.
   a) Positive b) Negative
   c) Lithography d) IC

7) The synonym of MODFET is _____.
   a) Modulation doped FET b) Modulation oxide doped FET
   c) Modulation oxide FET d) Modulated oxide doped FET

8) For triangular well, the energy levels (En) are proportional to _____.
   a) $n^{2/3}$ b) n
   c) n^2 d) $n^{1/3}$

9) The transistor having 100nm dimensions obeys _____ principle.
   a) Quantum b) Classical physics
   c) Both a & b d) None of these

10 The parabolic as well as square well wave functions solutions are _____ due to the symmetry of the potential well.
a) symmetric or antisymmetric.
b) sine functions
c) neither asymmetric or antisymmetric
d) cosine functions

B) State true/false. **06**

1) The particle moves throughout the structure without scattering is called diffusive regime of particle.
2) The zero DEG structure is often called as artificial atoms.
3) If $\lambda > L_{x,}L_{y}$ and $L_{x,}\ L_{y,} << L_{z}$ then it stands for quantum well.
4) The organic semiconductor has π and σ bonds.
5) The motion of particle in the nanoworld is determined by wave and quantum mechanics.
6) The homo-structures are made from the same material with non-uniform doping.

Q.2 Answer the following. **16**

a) Explain the lithography technique for nanostructure fabrication.
b) Explain the quantum well and dots in brief considering the lengths.
c) Discuss nanotechnology and nanoelectronics.
d) Discuss advantages of the nanostructures over microelectronics.

Q.3 **a)** Explain in detail Heterojunctions. **10**
b) Explain the triangular quantum well. **06**

Q.4 **a)** Explain in detail tunnelling effect and tunnelling elements. **10**
b) Write a note on multiple quantum well. **06**

Q.5 **a)** What do you mean by MOSFET structures. **10**
b) Write on nanoimprint lithography. **06**

Q.6 **a)** Explain the concept of superlattice and discuss the Kronig-Penney model of superlattice. **10**
b) Write a note on OLED. **06**

Q.7 **a)** Explain the characteristics lengths in nanostructures. **10**
b) Write a note on quantum wire. **06**

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Seat No.	

Set P

M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
ELECTRONICS
Mechatronics and Industrial Automation (MSC21406)

Day & Date: Thursday, 16-05-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) What is Mechatronics?
   a) The study of mechanical engineering
   b) The integration of mechanical engineering with electronics and computer control
   c) The study of computer programming only
   d) The study of industrial processes

2) Which of the following is NOT a type of feedback control system?
   a) Open-loop control b) Closed-loop control
   c) Bang-bang control d) PID control

3) What is PLC an abbreviation for in the context of Industrial Automation?
   a) Programmable Logic Controller
   b) Personal Logic Computer
   c) Program Logic Circuit
   d) Programmable Learning Controller

4) What is the purpose of feedback in a control system?
   a) To provide power to actuators
   b) To adjust the system's output based on the difference between desired and actual values
   c) To measure the temperature of the system
   d) To communicate with other systems

5) Which of the following sensors detects temperature?
   a) Accelerometer b) Gyroscope
   c) Thermocouple d) Encoder

6) What is the purpose of HMI (Human Machine Interface) in industrial automation?
   a) To connect machines to the internet
   b) To provide a graphical interface for interacting with machines
   c) To design mechanical parts
   d) To control actuators

7) What is the role of a microcontroller in a mechatronic system?
   a) To sense physical quantities
   b) To process data and execute control algorithms
   c) To convert mechanical energy into electrical energy
   d) To provide mechanical power to actuators

8) What is the primary function of a motor in a mechatronic system?
   a) To sense the environment
   b) To process data
   c) To convert electrical energy into mechanical energy
   d) To control actuators

9) In ladder logic, what does a normally open (NO) contact represent?
   a) A condition that is normally true
   b) A condition that is normally false
   c) A condition that is always true
   d) A condition that is always false

10) What is the function of a ladder diagram in PLC programming?
   a) To visualize the logic of the control program
   b) To measure temperature
   c) To convert mechanical energy into electrical energy
   d) To design mechanical parts

B) State true /false. **06**

1) Mechatronics encompasses robotics and automation.
2) RTU is used to display data at remote place
3) Industrial Automation reduces production costs.
4) The coil is moved toward the relay electromagnet when the relay is on.
5) Industrial Automation aims for increased efficiency and reduced human intervention.
6) PLC programming is done by using Labview.

Q.2 Answer the following questions. **16**

a) Write note on registers.
b) Explain the architecture of RTU with suitable diagram.
c) Write note on Arithmetic functions.
d) What do you mean by industrial automation.

Q.3 Answer the following

a) Draw Ladder diagram program to ON-OFF the out device and its equivalent circuit diagram. **10**
b) Write note on SCADA Protocols. **06**

Q.4 Answer the following

a) Write Timer function of PLC in detail with suitable example. **10**
b) What do you mean by design Process of mechatronics. **06**

Q.5 Answer the following.

a) Write note on DCS communication. **08**
b) Explain in detail architecture of DCS. **08**

Q.6 Answer the following.

a) What is SCADA? Explain types of SCADA in details. **10**
b) Write note on system modeling. **06**

Q.7 Answer the following.

a) Explain the PLC Devices. **10**
b) List the advantages and disadvantages of mechatronics systems. **06**